

ARTIFICIAL FEEDING.

AN IMPORTANT FACTOR IN THE PRODUCTION  
OF RICKETS.

Thesis for the Degree of M.D.

by

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The first investigations of Rickets seem to be lost in the mists of antiquity, for Rickets or a similar condition was certainly known before the Christian Era.

An old statue of Aesop's exhibited rachitic defects.

Hippocrates is said to have alluded to it.

Many have been the attempts in modern times to solve the problem of its Causation. It cannot be said however, that we have reached the solution. The difficulty of the problem may be gauged by the diversity and number of the views held.

The various main views may be classed as follows:-

1. Rickets A Congenital Condition.
2. Rickets A hereditary condition.
3. Rickets A food deficiency condition.
4. Rickets A result of any form of malnutrition.
5. Rickets A result of over-feeding.
6. Rickets A result of improper parental care, lack of hygienic surroundings, lack of exercise.
7. Rickets A result of defective action of the endocrine glands.



8. Rickets    A result of prolonged suckling.
9. Rickets    An infective condition.

The Vitamine theory, that is, that the deficiency of the "Fat Soluble A," accessory food factor leads to rickets has recently put forward important claims to scientific notice.

Mellanby's experiments appear conclusive. One's own observation of cases leads one to think that Rickets is indeed a food deficiency disease.

The varied etiology above mentioned, when closely scrutinized, is seen not to be a real classification at all.

I use the work classification in the scientific sense of sharp delimitation of groups, each of which is separate from the others.

In the causes given above it will be seen that there is considerable overlapping.

Any cause, such as delicacy of constitution, lack of sunshine etc., that prevents the child from assimilating the right food, is simply a contributory factor.

I maintain that with the right food and of course its assimilation, one cannot get rickets though one can find non-rachitic children thriving on apparently rachitic diet. As without the Cholera vibrio one cannot/

cannot get Cholera, yet some can drink water containing this vibrio without being infected.

This is a question of resistance of the tissues. It has been seen that increase of rickets is associated with artificial feeding.

In countries such as Japan, and the land of the Esquimaux, where suckling is the rule, rickets is rare.

The infants' natural food is the mothers' milk. Where, from any reason, this milk is defective in any constituent, or where the constituents are not in right proportion, then the milk ceases to be the normal food of the infant. One finds rickets sometimes in a breast fed child, and, on adding fat in a suitable form, the condition improves, as shown in my tabulated cases.

This proves that in these instances the breast milk was lacking in the fat constituent.

There are many reasons why artificial feeding is associated with rickets and these reasons would cover the various causations given before.

Let us examine these in the light of artificial feeding and food deficiency.

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### 1. Congenital Rickets.

This has been disputed by authorities who state that the condition of the bones in so called foetal rickets is not a true rachitic condition.

If we assume it to exist, the cause must be a maternal disability to nourish the foetus sufficiently - a food deficiency cause.

### 11. Hereditary Rickets.

A mother who had not the health to breast feed would in all probability bear a child with feeble powers of assimilation.

In the tabulated cases the tendency to rickets occurring in children with a rachitic family history is shown.

Alteration in diet put these children in a healthy condition.

In this city it is practically impossible to obtain wet nursing for the class of child brought to one's clinics, hence, one has had to add suitable fat to the feeds of rachitic breast fed babies or put them on a suitable artificial diet.

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111. Rickets - A food deficiency disease.

Judging from the cases brought to one's infant consultations and from the history of their diets, there appears to be no doubt that this is the true causation.

In the Midland Industrial City from which these observations are drawn, there are no slums such as one meets with in Edinburgh, Glasgow, and other great cities.

There are also no tenements and the sanitary conditions enjoy a high reputation.

Therefore the tabulated cases though placed under the headings of "Good" "Fair" and "Bad" Home Conditions, are merely comparative amongst themselves as will be seen from the definition of "Good" "Fair" and "Bad" given with the tabulated cases.

In the tabulated cases under "Good" Home Conditions we have 25 cases which may for convenience be divided into A. Artificially fed from birth or suckled for not more than 2 months - seventeen cases.  
B. Breast fed over 2 months but less than six months - four cases.  
C. Breast fed for 6 months or more - four cases.

It is noteworthy that the number of rachitic babies artificially fed from birth are suckled up to two/



two months<sup>is</sup> more than double the number occurring under B and C.

The severest cases in this series fall under A but no case is so marked as those occurring under inferior home conditions.

One reason for this is, that the babies were brought to one at an earlier age on the whole, and by mothers anxious for the good of their children's health.

These mothers had been dissuaded from suckling at all, or from continuing to suckle, by their doctors for good reasons and by relatives or friends who gave some reason such as "the child is too big for you to suckle" or "suckling would overtax your strength" or "your milk is poor" and so on.

In each case of artificial feeding in this series, the mother seemed genuinely disappointed that she "could not" breast feed.

In three cases of artificial feeding the mother was induced to attempt suckling with excellent results but as these three babies showed no signs of rickets they are not mentioned in the list of tabulated cases.

In the list of cases under "Fair Home" Conditions, the divisions into A, B, and C, are as before.

We have seventeen cases in this list, eleven of which/

which fall under A, three under B, and three under C.

Here again the number the rachitic babies artificially fed from birth or suckled less than two months out numbers the babies suckled for longer, being nearly double the latter. The severest cases fall under A and B. The two under B had both been suckled for 5 months, one was then given a starch diet - bread and milk until he was seventeen months, a diet unsuitable in quality at five months and also in quantity later.

The other was put on milk and water in equal proportions at five months and kept on this until he was twelve months - an insufficient diet especially as regards fat.

The four severe cases occurring under A, were -- two artificially fed from birth, one partially artificially fed for the first nine weeks, then entirely artificially, and one suckled two months then artificially fed.

Improvement in all these cases was seen with alteration of the diet or with addition of fat.

#### Under "Bad Home" Conditions.

We have 16 cases divided as before into A artificially fed from birth or not suckled for more than 2 months - ten cases.

B. Breast fed over 2 months but less than six months - two cases.

C./



C - Breast fed 6 months or over - four cases.

Here we have equally severe rickets under all three divisions and all cases to my knowledge, with the exception of one under A, which was not again seen by me, improved with alteration of diet or addition of fat. The baby whom I did not see again had Robinson's Groats from the age of two weeks up to the age of eighteen months, a diet lacking in the fat constituent.

Two severe cases under A and C divisions had also family histories of rickets and mothers who were unhealthy.

The improvement following alteration of diet and addition of fat was very marked in both. One case under C suckled over twelve months, was the youngest child in a family of nine. The eight former children did well, walked early, and their dentition was at the normal time. They had all been breast fed for about twelve months.

The mother when I saw her was badly nourished and looked worn and tired. The rachitic child improved on being weaned and on having cod liver oil.

This mother's conditions had become harder when her youngest child was born four years after the eighth child.

In this series again the cases under A are in the majority.

IV. "Rickets a result of any form of Malnutrition".

From one's own observations it is impossible to accept this view.

Malnutrition occurring as the result of congenital syphilis, tuberculosis, malaria, and severe scorbutus do not in the writer's experience lead per se to rickets.

The remedies which have been used with success for rickets have no effect on the wasting of congenital syphilis.

In India, where malaria is exceedingly common, accounting for the greatest mortality, rickets is a rare condition. The writer worked for five years in India, entirely with women and children, and came to the conclusion that this rarity of rickets was associated with breast feeding which is almost universal there.

Congenital syphilis and tuberculosis, which are infective conditions are conveyed by the mother, certainly, in the case of the former, and probably, in the case of the latter.

Therefore the milk of the mother in such cases is not that of a healthy woman.

Thus whether the infected infants are breast or artificially fed they are not on the normal diet.

Some/



Some cases of scurvy brought to my clinics have exhibited no signs of rickets.

Other scorbutic cases had rachitic manifestations as well.

The anti-rachitic remedies had no effect on the Scurvy which cleared up promptly with anti-scorbutic diet.

It has been stated, and with truth in the writer's opinion, that both Scurvy and Rickets are food deficiency diseases.

It has been proved that both are more frequently seen in artificially fed children.

V.     Rickets a result of over-feeding.

Over-feeding produces gastro intestinal disturbances with the result that the child digests an insufficient quantity of food.

If the child is on the wrong diet as well as being over fed he is doubly in the position to acquire rickets.

A healthy mother sometimes suckles too frequently and consequently she becomes tired and her milk becomes poor. It has been shown that for the gland to function properly the infant must empty it at each feed.

To do this, of course the child must be hungry, therefore/

therefore not suckled too frequently. In one of the tabulated cases it is shown now a breast fed baby under bad home conditions had developed early rickets, and, by merely decreasing the feeds the rickets cleared up.

Over feeding is much more liable to occur in artificially fed than in breast fed babies for the following reasons:-

- A. The Mother's breast cannot contain more than a given quantity of milk.
- B. The mother who suckles is usually a more devoted mother, than the mother who does not, and is interested in her child's health and observant of abnormal signs.
- C. The artificially fed child is often left in the care of a nurse or an elder child who stops his crying with a feed.

VI. Rickets a result of:- ( Improper parental care,  
( Lack of hygienic surround-  
( ings, - Lack of exercise.

The above causations are so closely associated with each other that they have been bracketed together.

They are all found under the definition of "Bad Home Conditions".

From my observation of ricketty infants brought to my clinics, I hold that food deficiency is the cause of rickets found in infants living under such conditions.

As/



As before stated, the majority of these rickety infants were found to be suckled for a period not exceeding two months or were artificially fed from birth. In spite of the bad housing, lack of exercise, etc., the rachitic conditions cleared up or improved with alteration of diet or merely by addition of fat.

The two cases tabulated under the heading "Boarded out Cases" were shown to be well housed and taken out regularly for exercise.

In spite of this they developed very severe rickets.

On examining the diet of these two infants it was found to be definitely lacking in the fat constituent.

The one baby had been on Cow's milk and water in equal proportions from five weeks of age to nine months. The other had been on Nestle's milk from birth up to two years of age.

The latter was the more severe case.

Cow's milk if diluted with an equal quantity of water, contains roughly less than half the fat that is in human milk. Nestle's milk diluted to the extent that is the rule contains even less fat.

Other cases of rickets on similar diet in the tabulated list cleared up or improved with alteration of/  
of/

diet or addition of fat showing they were food deficiency results. It may be reasonably assumed therefore, that the rickets of these two "boarded out cases" were also due to food deficiency.

VII. Rickets, a result of defective action of the Endocrine glands.

There does not seem to be conclusive evidence that this is so.

McCarrison states that the adrenals degenerate if there is lack of the accessory food factor.

In slight deficiency of adrenal function there is atony of the gastro-intestinal tract.

This is also met with in rickets, but further investigations are necessary before stating the same food deficiency is associated with both.

Regarding the part played by the Thyroid in rickets, I have seen no symptoms in rachitic children pointing to abnormal action of that gland.

The thymus gland, when diseased, is said to be the cause of rickets but this has been disproved by fairly recent experiments carried out by;-  
Renton & Robertson.

In the routine of my infant clinics, there is no possibility of investigating the action of the Endocrine glands in cases of rickets, beyond noting symptoms which show abnormal action.

So/



13a.

So far, these symptoms have not been found, except that, before mentioned, atony of the gastric intestinal tract.

VIII.      Prolonged suckling the cause of rickets.

This cause may be put under the heading "food deficiency" when it is found associated with rickets.

It is by no means always associated with rickets. As before mentioned, in India rickets is a very rare condition and prolonged suckling is the rule. One sees there, children suckled long after the period of nine months. In Japan also, rickets is rare and prolonged suckling is common. In our own country, children were formerly suckled for longer periods that now prevail but there is evidence that rickets are commoner now than formerly.

In the tabulated cases, babies breast fed, over nine months up to twelve months showing rickets are seen to improve on fat and alteration of diet, proving that the breast milk was then defective in the necessary constituents.

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IX.      Rickets an infective condition.

Pritchard states that chronic infections lead to rachitic manifestations but this so called cause of rickets has already been dealt with in the arguments against the cause of rickets headed as 'any form of malnutrition'.

Koch states that the disease is due to a coccal or bacillary infection of the bones.

He isolated these organisms from bones of children recovering from infectious disease.

In the writer's opinion, these organisms were not due to rickets but to the concomitant condition.

If bacilli and cocci were accountable for rickets then ricketty children would be infectious.

There is no evidence of rickets being infectious.

As shown in the tabulated cases, the ricketty child may be the only one of a large family suffering from rickets. In the day nurseries, inspected by me, there are rachitic and non-rachitic children lying side by side.

Under the suitable diet given there, the rachitic infant improves and the non-rachitic infant does not develop rickets.

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The following tabulated cases were seen at my clinics in Leicester.

Conditions as regards cleanliness and sanitation are good in this city. There are no tenements, and no slums such as one sees in Edinburgh, Glasgow, London, etc., so that the children with proper diet should stand a very good chance of being healthy. The following cases are classified as those living in:-

(1) Good Home Conditions; that is, where the parents are intelligent and interested in their children's health. The meals are at regular hours, the house is airy and kept clean, and the children are kept clean and taken out every day.

(2) Fair Home Conditions. Here the homes are untidy, both the parents go to work or the mother takes work into the home. The baby is looked after by young children. The meals are irregular because both parents are busy, but the children are not dirty, and the windows are not kept shut.

(3) Bad Home Conditions Here the parents are lazy and stupid. The children are dirty and neglected, as is the home, not because the parents are busy but because they are lazy. The house windows are not opened, and the children may not go out for days. Meals are at any time, and often consist of tinned food. The house is in a crowded area - that is crowded for this city.

(4)/



(4) Boarded out cases, usually illegitimate. Child is boarded out with nurse women whose house may be clean and airy but who does not understand children's feeding.

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Conditions at Home Good.

- Shimeld      B    Seen at 5 months. Slight thoracic rickets. Breast fed 3 months and dried milk since then. Treated with cod liver oil. At 7 months thorax improved.
- Higginson    A    Seen at 5 months, legs show signs of rickets. He was breast fed 3 weeks, then on Nestles' milk. Diet changed to dried milk. At 7 months no further signs of rickets.
- Brooks        A    Seen at 6 months. Rachitic thorax, and bronchitis, also some signs of rickets in legs. Never breast fed. On Cow's milk and water, then on glaxo. Advised cod liver oil. At 8 months, still rachitic but less so.
- Chawer        C    Seen at 5 months. Head sweating and restless. Head shape rachitic. Always breast fed. Butter added. After one month - seen again. Improvement in symptoms.
- Marlow        A    Seen at 4 months. Head sweating, rest-less. He had been breast fed for 1 month/



month; then put on malted food for 3 months. I changed the diet to Cow's milk  $\frac{3}{4}$ , and Water  $\frac{1}{4}$  and a pinch of butter to each feed. Seen at intervals of a month for 3 months. Steady improvement.

Stone

- A Seen at 9 months with slight signs of rickets in legs. Artificial feeding from birth - dried milk. Put on cod liver oil. At 10 months no other signs of rickets and legs were improved.

Sharman

- B First seen at 10 months, legs very markedly rachitic. Breast fed 3 months then glaxo up to 10 months. Put on ol morrh and splints to legs. Now seen at intervals of 2 weeks Condition is improving steadily.

J. H.

- C Seen at 6 months, breast fed entirely, Rachitic head and slightly rachitic thorax. Butter added to diet. At 8 months doing well.

J. A. S.

- C Seen at 8 months. Breast fed entirely up to now, but irregularly and only from one breast. Child was restless and had head sweating.

Musclés/

Muscles very soft. Diet supplemented with dried milk and butter. At 10 months, child was sleeping well and head sweating had ceased.

Shannon

- A Seen at 7 months. Had dried milk from birth. Rachitic and much head sweating, rachitic legs. Child suffers from bronchitis. Butter added to diet. At 8 months less head sweating and legs are not more curved.

Clifford

- A Seen at 7 months. Breast fed 2 weeks, then Cow's milk half and water half for 2 months, then dried milk for  $5\frac{1}{2}$  months. Put on cod liver oil. From mother's report this child had had head sweating and restlessness, but these had ceased. Thorax somewhat rachitic. Seen at 9 months, child is doing well.

D. K.

- A Seen at 16 months when head and chest were markedly rachitic. Had been breast fed 10 days, then barley water and milk in proportion of  $\frac{2}{3}$  of former to  $\frac{1}{3}$  of latter up to 9 months. From that age to present age he was on Cow's milk  $\frac{3}{4}$ , to barley water  $\frac{1}{4}$  and had/



had bread also. Nutrition was poor. I changed the diet to one suitable to his age and advised also massage and cod liver oil. At 18 months nutrition much improved and chest improved.

C. W.

A Seen at 8 months with marked signs of rickets in head, chest, and abdomen. He is the 10th child of his mother and has been on Nestle's milk since birth. Treatment, diet changed to dried milk and cod liver oil added. At nine months rickets less marked.

E.B.

C Seen first at 11 months with slight signs of rickets. Breast fed from birth. Treated with cod liver oil, and mixed diet, two months later no signs of rickets.

Hamilton.

A Seen first at 4 months - no signs of rickets, but at 8 months seen again when this condition was marked. Artificial feeding from birth, glaxo. Now put on treatment. Butter added to feeds - one month later, child/

Child lively - rickets not more marked, and child is growing quickly.

Shawyer

- A At 8 months there was head sweating. Thorax rachitic, spine rachitic. Breast fed 1 week, then on dried milk 1 week, then on Nestle's and Virol up to 7 months, at 8 months diet changed to dried milk. Child was put on treatment - cod liver oil. To lie out in the open air - 2 months later improvement was apparent.

Wheeler

- A Seen at 10 months. Chest rachitic. Child is lethargic. Fed from birth on Cow's milk and water, proportions not known. Treated with undiluted cow's milk with crusts and much butter and fresh air. One month later child is much brighter.

Jelly.

- A Seen at 5 months, head sweating, slightly rachitic thorax, distended abdomen. Artificial feeding from birth - glaxo for first four weeks then Allenbury's and virol, but gradually changed to cow's milk  $\frac{3}{4}$  and water  $\frac{1}{4}$  and a pinch of butter to each/



each feed. At 7 months no head sweating, child lively.

O. S.

A Seen at 16 months with slight rickets. Breast fed for 2 weeks then cow's milk and water  $1/3$  of former to  $2/3$  of latter for 6 months, then dried milk up to one year and then mixed diet. Cod liver oil given and improvement seen after 2 months.

Cooper

A At 16 months, legs and thorax slightly rachitic, abdomen distended, bronchitis. Artificially fed from birth. Pearl barley milk 3 months, then Neaves food and milk up to present age. Put on mixed diet with fat. At 18 months abdomen is much less prominent, child is lively and intelligent, and appears to be improving generally.

Joan

A At 5 months, rachitic chest and distended abdomen. Artificially fed from birth - glaxo. Butter added. At 8 months, abdomen not too prominent. No further signs of rickets and child is brighter.

Cox

B At 5 months, head sweating. Appearance of head and thorax rachitic.

Very/

Very lethargic child. Breast fed 3 months then cow's milk and barley water for 2 weeks, then up to date dried milk. Put on cod liver oil advised much fresh air. After two months much improvement was seen.

Garnett

B At  $6\frac{1}{2}$  months, head, thorax and legs showed signs of rickets. Child was listless and phlegmatic. Breast fed for 5 months then on dried milk. I treated the child with fresh air and exercise and added butter to her diet. At 9 months child was much improved and lively.

Lowe

A At 5 months rachitic. Breast fed for 2 weeks then Nestle's milk. I put the child on Cod Liver Oil and inspected him again at 9 months when he was much improved.

Parker

A At 14 months, legs and thorax, show signs of rickets. Breast fed 4 days, then on dried milk. Now has diet changed and butter added. At 16 months child is bright, & generally improved.

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Home Conditions Fair.L. W.

- C Seen at 13 months with slight signs of rickets in head and thorax, nutrition poor, temperament lethargic. History of feeding. - Breast 6 months Butler's malted food up to 13 months, now diet changed, butter added, and 1 month later, the child is brighter, takes more notice.

E. S.

- A First seen at 1 year and 7 months with rickets of limbs, thorax and head. History of diet since birth. Cow's milk and water half and half for 3 months, then cow's milk and water  $2/3$  of former to  $1/3$  of latter for 6 months, then gradually got on to the ordinary food; but this food appeared to be mainly carbohydrates. He is the 11th child of his mother. I put him on more fat and less Carbohydrates, 2 months later child's nutrition was better and child was livelier, and sleeping well.

M.S.

- A First seen at 7 months with rachitic thorax and much head sweating. History of diet since birth, breast fed 2 months, dried milk 5 months. Treated/

Treated, butter added to feeds, at 9 months the child was improved. Head sweating had ceased.

G.W.

A First seen at 10 months with rachitic head and thorax. History of diet from birth, vague, but child was only breast fed for 2 weeks, then put on King's Wheaten food and glaxo " and bits".

Treatment, diet changed and butter given. 1 month later, child appears to be doing well - Thorax showed some improvement.

R.B.

A First seen at 8 months with rachitic head and thorax. History of diet, Breast 2 months then glaxo, Treated with Cod Liver Oil - 1 month later child is doing well, lively, no head sweating, sleeps well.

C.B.

B First seen at 1 year and 8 months with marked rickets of head, thorax, and only 2 teeth. Nutrition very poor and child could not walk, head sweating. History of diet. Breast 5 months, then cow's milk half and half/



half up to 12 months. At 1 year mixed diet, feeding was at irregular intervals. Treated, diet regulated, cod liver oil added, carbo-hydrates restricted, one month later, improvement in nutrition and less head sweating.

Gooding.

- B First seen at 7 months with rachitic head and chest and restlessness. History of feeding. Breast fed 3 months, then on glaxo 2 weeks, then on Nestle's up to date of inspection. Child has been fed irregularly. Treatment, advised to gradually leave off Nestle's and get on to dried milk and feed child at regular intervals. At 9 months rickets were much less marked and child was contented and lively.

Waters

- A First seen at 10 months with slight signs of rickets. History of feeding. Cow's milk and water and King's Wheaten food from birth, fed irregularly. Advised more varied diet, with cod liver oil, one month later doing well. Child active and putting on weight.

Rickets/

Rickets had not increased.

Meadows

C Seen at 9 months with slight rickets, head-sweating, thorax slightly rachitic. History of diet since birth. Breast fed 6 months, then cow's milk and water half and half 2 months, then dried milk. Treated, diet supplemented and Cod Liver Oil given. One month later, less head sweating and child doing well.

Roberts

A Seen at 6 months. History of diet since birth. Breast fed for 2 months, on glaxo since then. Child shows signs of rickets in head and chest. Put on Cod Liver Oil. Two months later, rickets have much decreased - child very lively.

Munns

A Seen at 5 months when the head and thorax showed marked signs of rickets. History of diet from birth. Breast fed for 2 months, then in rotation, and for varying periods Nestle's King Wheaten's, Allenburys' and bananas, then on dried milk. We cannot tell how long he had each. The child was also/



also fed irregularly. I put him on dried milk and Cod Liver Oil, but I had to change this diet, as the child could not digest it. He was therefore put on Horlicks malted milk, and oil of morrh and yolk of egg was added in a couple of months. At 11 months the child showed marked improvement.

Sturges

- A Seen at 8 months with thorax very rachitic. Artificially fed from birth, first on cow's milk and water proportions unknown, then on Nestle's, then on dried milk - the last for 6 months. I added butter and at 11 months there was a marked improvement.

Frith

- A Seen at 7 months with markedly rachitic head, and head sweating. History of diet from birth. Breast fed for 7 weeks then on dried milk. Put on treatment (butter). At eight months - no head sweating, muscular tone improved.

R. J. H.

- C At 7 months commencing slight rickets. History of diet since birth. Breast fed 6 months then on dried milk, I had/

had seen the child at 6 months when there were no signs of rickets. Put on Cod Liver Oil.

At 9 months child showed no signs of rickets.

Eva H.

A Seen at 11 months with marked rickets in head, chest, and limbs. History of diet since birth. She had had breast and cow's milk for 9 weeks then put entirely on glaxo. I changed the diet and added cod liver oil - 2 months later great improvement and again 1 month later greater improvement.

R. R.

A Seen at 8 months with rachitic head and thorax. Breast fed 6 weeks, Nestle's 1 month, then glaxo and crusts up to 8 months, Treated with ol morrh now. At 9 months rickets had not increased - child bright, and lively.

C. S. C.

B Seen at 1 year and 5 months with rachitic head and chest. No teeth. Breast fed for 5 months, then bread and milk. Child's nutrition is poor/



poor, cannot walk. Put on suitable diet and massage. Two months later nutrition improved. Child appears well, cannot walk yet, but can stand.

Home Conditions Bad.Blasto

B Seen at 14 months - no teeth, head and chest rachitic. Muscles soft. History of diet. Breast 3 months, then glaxo up to 2 months. Put on Cod Liver Oil, and massage and diet regulated.

Seen again 1 month later, rickets appear stationary. Nutrition improved, and child is lively.

Hart

A Seen at 5 months, head rachitic in shape, beading of ribs and large distended abdomen, nutrition poor. History of diet. Breast 3 weeks then Cow's milk and water  $\frac{3}{4}$  of former to  $\frac{1}{4}$  of latter. Irregular feeding. Advised regularity of feeding and cod liver oil, as milk was probably poor in quality. Seen again at intervals of 2 weeks for 2 months; rickets appear to be decreasing; abdomen much less prominent.

Smith/



Smith

C Seen at 3 years with rickets of legs and head, and very poor muscular tone. Subject to bronchitis and enteritis. History of diet. Breast for 1 year, then anything that was going. Family history of rickets, mother looks unhealthy. The child was put on tonics, iron and cod liver oil. Seen two months later - general condition improved.

Olive

A Seen at 2 years, thorax rachitic, legs curved, cannot stand alone. History of diet. Breast 2 weeks, then Robinson's groats up to 18 months, then mixed diet. Child has not been brought to me again so I cannot tell if my advice of massage and cod liver oil has been followed. The diet is obviously wrong here.

Hull

A Seen at 10 months with marked rickets of head and thorax. Epiphyses of limbs were thickened. History of diet - partial breast feeding and cow's milk for 1 month, then entirely on glaxo. I put the child on vegetable juices and cod liver oil in addition/

addition to milk food. Seen again at intervals of 1 month up to 18 months, diet varied, with child's age, but kept on cod liver oil. At 18 months the child's thorax was greatly improved, the muscular tone good and she walks and tries to talk. This child's sister and brother were both rachitic. The mother's health is poor.

Edith

C Seen at 14 months - no teeth, with rachitic head and thorax and soft flabby muscles. The child cannot stand. History of diet. Breast fed 12 months, then weaned, but child took measles and mother put her on the breast again. This is the 9th child of the mother who looks worn out. She states her other children did well - teeth at usual time - walked early, but she was stronger with them. She breast fed them all for about 12 months. I have advised the mother to gradually wean the child and to give her cod liver oil and massage and also to put the child as much as possible in the open air. This seems clearly a food/



food deficiency case, the mother's milk being poor in consequence of her numerous pregnancies and her inability to get as good food as formerly. The child next to this one was 4 years old when this one was born. At that time living was not so dear. Seen 2 months later, improvement in nutrition of baby.

W. H.

- A First seen at 4 months with very slight signs of rickets. History of diet. Never breast fed, but type of food not obtained from mother who seemed unintelligent. Advised dried milk. Seen again 4 months later, when rickets were much more marked. Treated with cod liver oil and seen again 1 month later. Mother states child sleeps well and head sweating is less.

T. R.

- C Seen at 6 months with slight signs of rickets in head and thorax. Breast fed from birth for 2 months, Cod Liver Oil advised. Seen at intervals of 2 weeks. Child seems lively and contented, and rickets appear healed at 10 months.

A. T./

A. T.

C Seen at 6 months with no signs of rickets. Seen again at 12 months with marked rickets. History of feeding. Breast fed up to 10 months, then on mixed diet - exact diet not obtained. Advised suitable diet for 2 months and given cod liver oil. At 14 months some improvement.

P. M.

A Seen at 8 months with rachitic head and chest. History of feeding. Glaxo from birth with about one breast feed a day. Advised cod Liver Oil. At 9 months rickets not more advanced. Child very lively, and growing quickly.

Edna B

B First seen at  $5\frac{1}{2}$  months with slight signs of rickets in chest. History of diet. Breast fed from birth, but too frequently, night and day. Treated by regulating the feeds to three hours during the day and an interval of not less than 6 hours at night for 2 weeks. Improvement. Then feeds were 4 hourly and an interval of nine/



nine hours at night. At 7 months child is brighter and contented, thorax practically right.

Burden.

A Seen at 7 months with head sweating and slight curvature of the legs. Seen again at 8 months; rickets more advanced. History of diet. Breast fed 2 weeks then put on dried milk, at 8 months treated him with massage and added butter to his diet. At 9 months child had improved.

Warrick

A Seen at 5 months with signs of slight rickets. Artificially fed from birth - Cow's milk for 9 weeks then dried milk. Advised massage and cod liver oil. Seen again at 6 months - rickets had decreased.

Major

A Seen at 5 months with beading of ribs and slight lateral depression, of thorax, legs were slightly curved. History of diet, Allenbury's for first 3 weeks, then dried milk. Advised butter. Seen again at 8 months with marked improvement.

May

A Seen at 6 months with head sweating and/

and rachitic thorax. History of diet. Breast for 7 weeks then for 4 weeks breast and baked bread then put on dried milk without bread.

I advised cod liver oil with dried milk - one month later head sweating had ceased, and there was a general improvement.

Martin

A Seen at 7 months with rachitic head. History of diet. Breast 2 weeks, then glaxo. Treatment of morrh. One month later rickets were not more marked. Child was very lively, and putting on weight.

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Boarded out Cases.A.W.

First seen at  $3\frac{1}{2}$  years. Artificially fed from birth. First food not known. At four months child was boarded out to nurse and then given Nestle's milk until he was two years.

At 2 years put on mixed diet.

At  $3\frac{1}{2}$  years he cannot stand, he has a markedly rachitic thorax and head.

His abdomen is much distended.

His nutrition is very poor, and he has the appearance of an infant of 10 months. The nurse woman's house was clean and airy, and she took him out regularly, but she seemed stupid and never asked advice re diet until the child was two years. I could not put him on Cod Liver Oil as he was suffering from gastro-enteritis.

Hartshorn. Seen first at 2 years with very marked rickets of legs, arms, head, and thorax. Nutrition poor. History of diet. Breast fed five weeks then boarded out with nurse women who put him on Cow's milk and barley water in equal proportions up to nine months of age. Then put him on "mixed diet". His legs and arms were noticed/

noticed by nurse to be curved when he was 8 months but she thought he would "outgrow that" and did not seek advice. She took him out regularly. I have put him on cod liver oil and sent him to the surgical department at the Infirmary.

I saw him again after 2 months - - nutrition had improved.

This case was rather less severe than the former.

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